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Evidence for word-internal phonological words in German

The phonological word (henceforth pword) differs from lower units of the prosodic hierarchy (e.g. foot, syllable) in that its boundaries must align with morphological boundaries. While languages are claimed to differ w.r.t. the questions of whether and which word-internal constituents (e.g. stems, prefixes, suffixes, members of compounds) form a pword there is no consensus regarding the question of which diagnostics are relevant for determining pword structure. In this paper it is argued that systematic correlations between various suprasegmental properties (e.g. stress patterns, syllable structure) motivate the existence of word-internal pwds in German.

1. The prosodic structure of compounds

The words in 1a, b illustrate several prosodic regularities of German simplexes. The last branching foot is most prominent (e.g. *Schòkoláde*, but **Schókolàde*). Certain endings including *-at*, *-an*, attract main stress in polysyllabic words (cf. 1b). Tense vowels are long if stressed unless they occur in pretonic position (e.g. *Schòkol[á:]de*, but **Sch[ò:]koláde* cf. Reis 1974: 182ff.).¹ Vowels in pretonic position are subject to laxing in colloquial speech (*Sch[ò]kol[á:]de* ~ *Sch[ò]kol[á:]de* cf. Vennemann 1991: 234ff.).² The syllable structure satisfies the Law of Initials (henceforth LOI) which means that prevocalic consonants are syllabified in onset position as long as they also occur word-initially.³ In the examples below only the main and the last stress within each word are indicated. The indication of syllable structure is confined to LOI-violations:

- | | | |
|-----|--|--|
| (1) | a. Sch[o]kol[á:]de 'chocolate'
K[o]kol[ó:]res 'rubbish' | c. Z[i:]gel.[ò:]fen 'brick oven'
Féier.[à:]bend 'closing time' |
| | b. Konglomer[á:]t 'conglomerate'
K[a]tamar[á:]n 'catamaran' | d. H[ó:]r.appar[á:]t 'hearing aid'
Schúnd.rom[á:]n 'pulp novel' |

The compounds in 1c, d violate the prosodic wellformedness conditions listed above. The rightmost foot is not the most prominent one in spite of branching. Endings like

¹ Exceptions to this generalization are words like [à:]brakad[á:]bra, T[ò:]huwab[ó:]hu, where vowel lengthening in the first syllable is 'copied' from the vowel in the penultimate syllable to the effect that the first and the last foot rhyme.

² Pretonic Laxing in German differs from Trisyllabic Laxing in English in that it does not apply to vowels carrying main stress (e.g. P[é]likan, but *P[é]likan).

³ The LOI requires some modification since the syllabification of word-internal clusters also depends on stress and on the degree of sonority increase within the cluster. The cluster *pr* forms a complex onset in *April* but the cluster *kn* is heterosyllabic in *Akne*, even though both clusters occur word-initially.

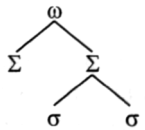
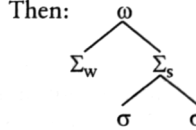

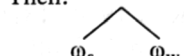
-at, -an, fail to attract main stress. There are LOI-violations.⁴ The fact that these violations occur in morphologically complex words indicates the presence of word-internal phonological word (henceforth pword) boundaries. The words in 1c, d are consistent with the prosodic wellformedness conditions in question provided that the domain of these conditions is the pword and that each member of a compound forms a pword (cf. 2):

- (2) (K[o]kol[ó:]res)_ω (Z[í:]gel.)_ω[(ò:]fen)_ω

Given the structures in 2 the apparent violations of the prosodic generalizations stated above follow from the prosodic hierarchy in 3. Specifically, assuming that every unit must be properly contained within each higher unit of which it is a part it follows that neither syllables nor feet may extend across pword boundaries.

- (3) ω phonological word
Σ foot
σ syllable

Reference to the prosodic constituents in 3 allows for a description of the distinctions in relative prominence shown in 1 in terms of the rules in 4, which apply to sister constituents in the prosodic hierarchy (cf. Giegerich 1985: 36, 118f.):

- (4) a. If:  Then: 
- b. If:  Then: 

Both rules in 4 make crucial reference to the pword. The rule in 4a describes the relative prominence between feet within a pword whereas the rule in 4b describes the relative prominence between pwords. That is, the rule in 4b determines the relative prominence between the two most prominent syllables within each pword regardless of the number of intervening syllables (e.g. *Féldsálát* 'lamb's lettuce', *Hórapparát*, *Stáatssekretariát* 'permanent office'). Since a pword forms a single domain of stress and of syllabification reference to pwords captures the correlation between the relative prominence patterns and the occurrence of LOI-violations in 1.

The rule in 4b is sensitive to both prosodic and semantic structure as it applies only to endocentric compounds. For non-endocentric compounds relative prominence is reversed as is illustrated in 5. The compound in 5a consists of an intensifier followed by its head, that in 5b is coordinative, and that in 5c includes a member of a minor lexical category (e.g. preposition, particle) as a second member (some of the examples are from Wilmanns 1911: 441ff.).

- (5) a. Mördsspektákel 'INT spectacle' (cf. Mórdwaffe 'murder weapon')
b. s[ÿ:]ßsáuer 'sweet-and-sour' (cf. chlórsáuer 'chlorine sour')
c. g[è:]gen.über 'opposite' (cf. Blúmenkübel 'flower tub')

⁴ Glottal stops are assumed to be epenthetic in German since their occurrence is entirely predictable.

2. Words derived by prefixation

Many prefixed words in German exhibit correlating violations of regular stress and syllabification patterns which show that the prefix forms a separate pword. These correlations are illustrated in 8 (cf. the regular patterns in 8b):

- (8) a. $\acute{U}r.\acute{o}pa \Rightarrow (\acute{U}r)_{\omega}(\acute{o}pa)_{\omega}$ b. $Eur\acute{o}pa \Rightarrow (Eur\acute{o}pa)_{\omega}$
 [ur]PREF[opa]STEM 'great-grandpa' [europa]STEM 'Europe'

Both the weak prominence on the last branching foot and the LOI violation indicate that the word *Uropa* consists of two separate pwords, for which relative prominence is determined by the rule in 4b. The phonological evidence for internal pword structure correlates with the morphosyntactic evidence: all historically prefixed words which exhibit the prosodic violations in question have the morphological structure [prefix][stem] where the stem is typically an independent word. The additional examples in 9a, b versus 9c, d show that neither productivity nor nativeness are requirements for the parsing of prefixes as separate pwords.

- (9) a. ($V\acute{o}r$) $_{\omega}$ ($\acute{a}bend$) $_{\omega}$ 'eve (of)' c. ($For\acute{e}lle$) $_{\omega}$ 'trout'
 ($D\acute{e}s$) $_{\omega}$ ($\acute{i}nter\acute{e}sse$) $_{\omega}$ 'lack of interest' ($Desper\acute{a}do$) $_{\omega}$ 'desperado'
 ($\acute{A}nti$) $_{\omega}$ ($f\acute{a}s\acute{c}hismus$) $_{\omega}$ 'antifascism' ($Antib\acute{i}otikum$) $_{\omega}$ 'antibiotic'
 b. ($\acute{a}b$) $_{\omega}$ ($norm\acute{a}l$) $_{\omega}$ 'abnormal' d. ($abdomin\acute{a}l$) $_{\omega}$ 'abdominal'
 ($Pr\acute{o}$) $_{\omega}$ ($semin\acute{a}r$) $_{\omega}$ 'proseminar' ($Propag\acute{a}nda$) $_{\omega}$ 'propaganda'
 ($s\acute{u}per$) $_{\omega}$ ($nerv\acute{o}s$) $_{\omega}$ 'supernervous' ($s[u]perstiti\acute{o}s$) $_{\omega}$ 'superstitious'

For the words in 9a weak prominence on the last branching foot is a boundary signal which indicates the existence of two separate pwords. For the words in 9b weak prominence on the regularly main stress attracting ending indicates the presence of an internal pword boundary. Violations of regular prominence patterns correlate systematically with LOI violations in words with vowel-initial stems.

The evidence from stress and syllabification does not correlate for all prefixed words as is illustrated in 10.⁵ The prefixes in 10 do not carry main stress and yet they form separate domains of syllabification as is indicated by the LOI-violations.⁶

- (10) a. ent.eignen b. er.ahnen 'to foresee' c. be.staunen 'to marvel at'
 'to dis-own' zer.reden 'to flog to death' ge.brauchen 'to use'
 ver.arbeiten 'to process'

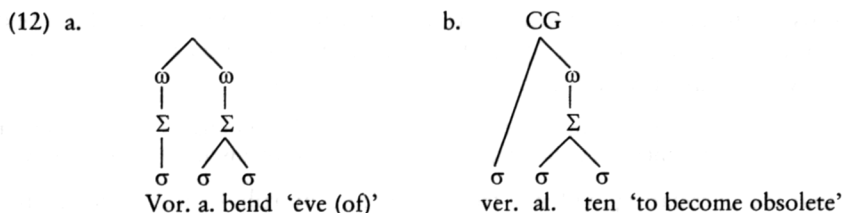
⁵ Féry states that the prefixes in 10b, c "do not fulfill the Minimal Word requirements of bimoraicity or disyllabicity and, consequently, they must be integrated into the following Prosodic Word" (1995: 218). This conclusion conflicts with the evidence from syllabification, which shows that prefixes are generally not syllabified together with the stem and are, consequently, not integrated into the following pword. Exceptions to this generalization are very few high frequency verbs like *erinnern* 'to remember' where the consonant of the prefix can appear in onset position in colloquial speech. Such prosodic fusion is in general unacceptable (cf. **e.rahnen*).

⁶ While the vowel-final prefixes naturally cannot violate the LOI there is other phonological evidence for their non-integration into the pword of the stem. Consider verbs like *be[ʃ]taunen*, where the palatalized fricative indicates pword-initial position. The claim that the constraint in question applies pword-initially rather than syllable- or foot-initially is supported by the occurrence of alveolar fricatives in words like *Bá[s]tãrd*, *Zi[s]térne* 'well'.

The prefixes in 10 differ from those in 9 in that they can affect the combinatory properties of the stem (e.g. the valency of the verbs) and hence function as the head of the derived structures. The difference between those prefixes can accordingly be described by the alignment constraints in 11:⁷

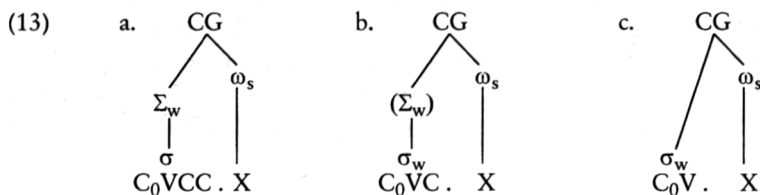
- (11) a. ALIGN (NONHEAD PREFIX, L; PWORD, L)
 ALIGN (NONHEAD PREFIX, R; PWORD, R)
 b. ALIGN (HEAD PREFIX, L; SYLLABLE, L)
 ALIGN (HEAD PREFIX, R; SYLLABLE, R)

The alignment constraints in 11 are illustrated in 12. Morphemes which are dominated by a syllable, but not by a pword, will henceforth be referred to as clitics (CG = Clitic Group):

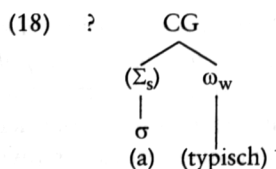


The claim that the prefixes in 10 do not form separate pwords is supported by distinctions in (historical) vowel reduction. In Krech (1982) the prefix *ent-* is represented with a full vowel whereas the prefixes in 10b are represented as [ɐ], [tsɐ], and [fɐ], where [ɐ] is the phonetic manifestation of the sequence /ər/ (cf. [bitɐ] *bitter* 'bitter'). Giegerich (1985: 172) claims that the prefixes *ent-* and *er-* do not reduce thereby contrasting with the prefixes *ver-* and *zer-*, the latter of which is claimed to 'probably' reduce. All descriptions agree in that the prefixes in 10c have a reduced vowel, i.e. schwa.

It appears then that the degree of reduction correlates with the number of consonants following the vowel: reduction does not occur when two consonants follow, varies when one consonant follows, and is obligatory in open syllable. Assuming that vowel reduction is conditioned by stress it can be concluded that stress in the prefixes in 10 is weight-sensitive as is shown in 13.



⁷ The alignment constraints in 11b need to be modified in several respects. First, so-called separable prefixes function as heads because they can affect the combinatory properties of the verb stem and yet they consistently form separate pwords (e.g. *nehmen* 'to take' vs. *ánnèhmen* 'to assume', *geben* 'to give' vs. *ángèben* 'to brag'). Second, disyllabic prefixes always form separate pwords regardless of their syntactic properties and of relative prominence (e.g. *(ùber)(sètzen)* 'to ferry across' vs. *(ùber)(sètzen)* 'to translate' as is shown by evidence from syllabification and vowel lengthening. Third, some monosyllabic head prefixes idiosyncratically form separate pwords (e.g. *um-* in *ùmgehen* 'to avoid').



Alternatively, it could be proposed that the prefix is integrated into the pword of the stem. However, that proposal is also incompatible with the evidence from stress (cf. the patterns in 16a vs. 16b). The only prosodic structure to capture the systematic correlation between the placement of main stress and the morphological structure in 16a is the one in 17a.

To sum up, I will argue that while vowel reduction (or in general weight sensitivity in stress assignment) shows that an affix does not form a separate pword the combination of monomoraicity and stable stress actually argues for the assumption that an affix forms a separate pword. This is because for an affix which is dominated by a pword the stability of stress does not depend on moraic structure but rather is secured by the fact that the pword functions as domain for stress assignment and necessarily dominates at least one foot.⁹

Consider next the systematic correlation between LOI-violations, stress-violations, and morphological structure in adjectives derived by *iN*-prefixation.

- (19) ín.adäquát 'inadequate', ín.offizièll 'unofficial', ín.effektív 'ineffective'

The observation that *iN*- and *un*-prefixations exhibit the same type of prosodic properties is significant because *iN*-, but not *un*-, assimilates to a following sonorant as is shown in 20.

- | | | | |
|---------|--|----|--|
| (20) a. | ú[n]populär 'unpopular'
ú[n]musikálisch 'unmusical'
ú[n]lògisch 'illogical'
ú[n]rentàbel 'unprofitable' | b. | í[m]praktikàbel 'impracticable'
í([m])moràlisch 'immoral'
í([l])liberàl 'illiberal'
í([r])relevànt 'irrelevant' |
|---------|--|----|--|

The identical behavior of the prefixes *un*- and *iN*- w.r.t. syllabification and stress indicates that they have identical prosodic representations: they both form separate pwords. The claim that *iN*- can form a separate pword is further supported by the lack of weight sensitivity: stress on the prefix is stable and vowel reduction is entirely unacceptable even in cases where the prefix fails to satisfy Minimal Word Requirements due to degemination (i.e. in combination with sonorant-initial stems, e.g. [í]relevànt, [í]liberàl)). Note, finally, that the prefix *iN*- attracts main stress only if the stem matches an independent word (e.g. (ín)_ω(stabil)_ω 'unstable' vs. (imbezíl)_ω 'imbecile').

There is clear evidence then that the difference between the prefixes *un*- and *iN*- w.r.t. assimilation does not reflect on their prosodic form. The same conclusion applies to English, where the evidence from stress also shows that the corresponding prefixes *un*- and *iN*- both form separate pwords (cf. Raffelsiefen 1999):

- (21) a. (érudite)_ω b. (ùn)_ω(álíke)_ω (ím)_ω(políte)_ω

⁹ This is not to deny the markedness of the structure in 17a. Perhaps the variants with long vowels listed in Krech (1982) owe their existence to a preference for pwords which do satisfy Minimal Word Requirements.

3. Words derived by suffixation

While all prefixes form a separate domain of syllabification in German, there are two types of suffixes: those which are syllabified together with the stem versus those which are not. The two classes are distinguished phonologically: the first class includes all vowel-initial suffixes while the latter includes all consonant-initial suffixes (cf. Wiese 1996 and Booij 1985 for a similar observation for Dutch). The claim that consonant-initial suffixes are not integrated into the domain of syllabification of their stem is based on LOI-violations in careful standard pronunciation illustrated in 24:

- | | | | |
|------|-------|----------------------------|---------------------------|
| (24) | -tum | Deut[s.t]um 'Germanness' | (cf. [ʃt]ier 'bull') |
| | -nis | Schre[k.n]is 'horror' | (cf. [kn]ie 'knee') |
| | -los | schla[f.l]os 'sleepless' | (cf. [fl]asche 'bottle') |
| | -mut | Gro[s.m]ut 'magnanimity' | (cf. [sm]aragd 'smaragd') |
| | -voll | ma[s.f]oll 'moderate' | (cf. [sf]äre 'sphere') |
| | -lein | Flä[s.l]ein 'small bottle' | (cf. [ʃl]auch 'hose') |

The distinct syllabifications of the clusters in each row in 24 are supported by allophonic variations. For example voiceless stops are aspirated only in syllable-initial position (e.g. [t^h]ier 'animal'), but not if they are preceded by another segment (e.g. [ʃt]ier 'bull'). The aspiration of the /t/ in *Deutsch[t^h]um* indicates accordingly that the suffix is not syllabified together with the stem. Consider next the evidence from 'Final Devoicing' in 25.¹⁰

- | | | | | | | |
|------|----|-------------------|----------------------|----|------------|-----------------|
| (25) | a. | Gebir[k.l]er | (cf. Gebir[g]e) | b. | Nör[g]ler | (cf. nör[g]eln) |
| | | 'mountaineer' | 'mountains' | | 'grumbler' | 'to grumble' |
| | | Kunstgewer[p.l]er | (cf. Kunstgewer[b]e) | | Grü[b]ler | (cf. grü[b]eln) |
| | | 'artisan' | 'arts and crafts' | | 'brooder' | 'to brood' |

The systematic voicelessness of the bracketed obstruents in *-ler*-derivations, but not in *-er*-derivations, cannot be explained with reference to either segmental nor metrical structure. Rather, this difference reflects the fact that consonant-initial suffixes are not syllabified together with their stem whereas vowel-initial suffixes always are.

In general, German consonant-initial suffixes form a separate domain not only of syllabification but also of stress as is shown by the weight-insensitivity of suffixal stress. Compare the German suffixes in 26a with their English cognates in 26b:¹¹

¹⁰ The term 'Final Devoicing' refers to a non-violable constraint against voiced obstruents in coda position in German. The distinctions illustrated in 25 are represented consistently in Drosdowski (1990). This is not to deny the considerable range of variation in actual speech (cf. Eisenberg 1993: 107ff.). The main phonological source for variation is the fact that many speakers do not allow for complex onsets in schwa syllables and consequently devoice the obstruents in 25b (e.g. *Nör[k.l]er*). Another source of variation relates to morphology. The distinct syllabifications in 25a vs. b presuppose that speakers are aware of the morphological boundaries (e.g. *Gebirg+ler* vs. *Nör[gl]+er*). However, there is no reason to assume that speakers necessarily depart from the original morphological structure or even are aware of that structure when uttering these words.

¹¹ A similar difference shows up in other function words (cf. the English modals [kən] 'can' [ʃəl] 'shall' with their German cognates [kan] 'kann', [zəl] 'soll').

- (26) a. [lo:s] -los
[fəl] -voll
[tu:m] -tum
[nis] -nis
[zə:m] -sam
[mənt] -ment
[lət] -let
- b. [ləs] -less
[fəl] -ful
[dəm] -dom
[nəs] -ness
[səm] -some
[mənt] -ment
[lət] -let

The claim that stress is weight-sensitive in English suffixes is supported by the fact that vowels followed by clusters have generally not reduced (e.g. *-fold*, *-most*). The difference between the prosodic structures of German and English suffixed words are illustrated in 27:

- (27) a. German
-
- b. English
-
- harm+lo:s 'harmlos' harm+ləs 'harmless' tu:+fo:ld 'twofold'

Since German suffixes form separate pwords stress is assigned by position and consequently is insensitive to weight. Historically, this held for English as well but synchronically suffixes no longer form pwords and hence no longer form domains for stress assignment. As a result the stability of stress in English suffixes came to be determined by weight: the more complex the coda the more stable the stress. The structure in 27a is described in 28.

- (28) a. ALIGN (C-initial SUFFIX, L; PWORD, L)
ALIGN (C-initial SUFFIX, R; PWORD, R)
- b. If: (stem)_ω(suffix)_ω Then:

While the rule in 28b has no exceptions there are a few counterexamples to the rule in 28a. The occurrence of schwa in 29a shows that the suffixes do not form domains of stress. They are accordingly not pwords.

- (29) a. -ler Sport[lər] 'athlete'
-ner Rent[nər] 'pensioner'
-chen Würst[çən] 'small sausage'
-sel Mitbring[zəl] 'small present'
- b. -lich lieb[lɪç] 'lovely'
-ling Lieb[lɪŋ] 'darling'
-nik Kibbuz[nɪk] 'member of a kibbutz'

The initial consonant in the suffixes *-ler* and *-ner* is due to the reanalysis of stem-final *l/n* as part of the suffix which happened after the (then vowel-initial!) suffix *-aere* had reduced to [ər].¹² The claim that reanalysis followed vowel reduction is supported by

¹² I agree with Fleischer (1975: 144f.) in assuming that MHG schwa syncope in dactylic words like *Radler* 'bicycle rider' (i.e. *rād[ə]l[ə]r* > *rād[lə]r*) triggered reanalysis. However, in my opinion the crucial impact of syncope was not its effect on the syllable structure of the agentive nouns but rather its effect on the recognition of base relations. That is, as a result of syncope agentive nouns which were derived from a morphologically complex verb (i.e.

the fact that words which are derived by the reanalysed consonant-initial suffix are never attested with a full vowel in the suffix. Establishing this sequence of events is important because only consonant-initial suffixes form separate pwords and consequently do not allow for vowel reduction.

It appears then that the alignment rule in 28a, which relates morphological to prosodic structure, is blocked when a suffix cannot be parsed as a separate pword due to a violation of phonological well-formedness conditions (e.g. the absence of a full vowel). Similarly, the non-application of the alignment rules in 28a to the suffix *-chen* may be due to the phonotactic constraint against palatal fricatives in word-initial position in German.¹³ Because the suffix *-chen* cannot be parsed as a pword stress destabilized and the stem vowel reduced to schwa. This account does not apply to the suffix *-sel*, a reduced variant of the suffix *-sal*, which continues to form a pword (i.e. [za:l]). Some conditions under which reduction took place are discussed in Wilmanns (1896: 272). All suffixes in 29a are prosodically best analysed as clitics.

The prosodic form of the suffixes in 29b, which end in a high consonant, is more difficult to determine. Since MHG only high lax vowels (preferably [ɪ]) have been allowed before high consonants in unstressed position (e.g. *Pfirs*[ɪ]ch 'peach', *Méss*[ɪ]ng 'brass', *Grammát*[ɪ]k 'grammar'). As a result [ɪ] and [ə] are in complementary distribution in unstressed syllables in NHG: [ɪ] occurs before high consonants whereas [ə] occurs elsewhere. However, in stressed syllables [ɪ] contrasts with other full vowels before high consonants (e.g. *St*[ɪç] 'sting' - *P*[ɛç] 'pitch', *T*[ɪʃ] 'table' - *r*[aʃ] 'quick'). These distributions raise the question of whether the vowel [ɪ] in the suffixes in 29b is in complementary distribution with [ə], which means that those suffixes form clitics, or of whether that vowel contrasts with other full vowels, which means that those suffixes form separate pwords. While I will leave this question open here I opt tentatively for the latter alternative in view of the exceptional status of the clitic suffixes in 29a.

The account of consonant-initial suffixes proposed here conflicts with Hall's claim that the suffixes *-lich*, *-sam*, and *-bar* are stressless (cf. Hall 1998). His first argument concerns allomorphy in the superlative affix: as a result of historical conditions on schwa syncope *-əst* occurs after stressed syllables which end in a coronal obstruent whereas *-st* occurs elsewhere. The occurrence of *-st* after *-lich* is hence claimed to indicate that the suffix is unstressed. This argument is relevant only for those German dialects in which the original palatal fricative [ç] has merged with the coronal fricative [ʃ]: in standard German the selection of *-st* in words derived by *-lich*-suffixation is predicted on the basis of segmental structure alone. Even for the 'fricative-merger'-dialects Hall's argument would hold only if merger would cause schwa-epenthesis (i.e.

[[[rad]_N+el]_V+er]_N 'wheel + verb suffix + agentive suffix') lost phonological transparency w.r.t. the verb stem (i.e. *radler* - *rad*[ə]l-), but not w.r.t. the noun stem (i.e. *radler* - *rad*). Hearers/learners were accordingly more prone to relate *Radler* to the noun stem *Rad*, with the result that the suffix was reanalysed as a denominal suffix *-ler* which henceforth combined with nouns (e.g. *Sportler* 'sport+agentive suffix'). A similar account holds for *-ner*. The fact that there is no reanalysed suffix *-rer* is due to the fact that syncope did not apply before that sequence (e.g. *Wild*[ə]rer 'poacher'). For discussion and alternative accounts, see Fuhrhop (1998: 51ff.)

¹³ This constraint is violated only in names and recent loanwords in northern standard NHG (e.g. *China* 'China', *Chemnitz* 'Chemnitz', *Chemie* 'chemistry').

a reselection of the superlative allomorphs). However, the short superlative form is retained in merger-dialects (e.g. *fre*[ʃ]ste 'cheekiest', *rei*[ʃ]ste 'richest'). The occurrence of *-li*[ʃ]ste sheds therefore no light on the prosodic form of the suffix *-lich*. Hall's other argument from allomorphy, which affects all three suffixes, is equally problematic. Based on his claim that *-keit* occurs after stems ending in an unstressed syllable whereas *-igkeit* selects only stressed syllables the occurrence of *-keit* after the suffixes *-lich*, *-sam*, and *-bar* is interpreted as indicative of their stresslessness. However, the true condition for *-igkeit*-suffixation is far more restricted than Hall suggests: the suffix attaches only to the suffixes *-haft* and *-los*.¹⁴ A possible generalization is then that *-igkeit* attaches to suffixes ending in a coronal obstruent, which excludes the suffixes *-lich*, *-sam*, and *-bar* without referring to stress.¹⁵ The evidence from allomorphy is accordingly consistent with the analysis of *-lich*, *-sam*, and *-bar* as pwords, which necessarily dominate a foot.¹⁶

Consider finally the prosodic structure of vowel-initial suffixes. The claim that bimoraic (including all bisyllabic) vowel-initial suffixes are integrated into the pword of the stem is supported by the fact that such suffixes form one domain of syllabification and of stress together with the stem. Tense vowels in pretonic position are short regardless of the length of the corresponding vowel in the base. The examples in 30a are derived by monosyllabic suffixes whereas the examples in 30b are derived by bisyllabic suffixes.

- | | | | |
|---------|--|----|---|
| (30) a. | (emoti[o]n[á:l]) _ω (cf. Emoti[ó:]n)
'emotional'
(kons[u]ll[á:r]) _ω (cf. Kons[ú:]ll)
'consular'
(brav[u]r[é:s]) _ω (cf. Brav[ú:]r)
'brilliant'
(Zitr[o]n[át]) _ω (cf. Zitr[ó:]ne)
'candied lemon peel' | b. | (sal[u]t[í:]ren) _ω (cf. Sal[ú:]t)
'to salute'
(mis[ə]r[á:]bel) _ω (cf. Mis[é:]re)
'miserable'
(Delik[a]tése) _ω (cf. delik[á:]t)
'delicacy'
(S[a]tanísmus) _ω (cf. S[á:]tan)
'Satanism' |
|---------|--|----|---|

The prosodic form of the suffixed words in 30 is indistinguishable from that of simplexes (e.g. (ban[á:]l)_ω, (Sal[á:]t)_ω). Monomoraic vowel-initial suffixes, which do not carry main stress, fall into two categories: 'stress-shifting' vs. 'stress-neutral'. The question of which of these categories such suffixes belong to is not revealed by their form but rather must be considered an idiosyncratic property as is shown by the (near-)homophonous suffixes in 31a, b:

- | | | | |
|---------|--|----|---|
| (31) a. | Tálmùd + [ɪʃ] → talmúdisch
Prótòn + [ən] _{PL} → Protónen | b. | Élènd + [ɪç] → élèndig
Róbòt + [ən] _{INF} → róbòten |
|---------|--|----|---|

¹⁴ Attaching the suffix to other forms is unacceptable (e.g. *Cooligkeit, *Fittigkeit). Alleged cases of *-igkeit*-suffixation to stressed stems like *Feuchtigkeit* 'moistness', *Schnelligkeit* 'quickness' are generally reflexes of historical *-heit*-suffixations to stems ending in *-ic* (e.g. MHG *viuhtic* + *heit* → *viuhticheit*, *snëllic* + *heit* → *snëllicheit*) with subsequent loss of the *-ic*-forms (but not their stems *viuht*, *snëll*, etc.). As is well-known the loss of these forms is the historical source of the reanalysed fused suffix *-igkeit*.

¹⁵ Similarly the English suffix *-ive* attaches only to stems ending in *-s* or *-t*.

¹⁶ Hall's conclusion that *-bar* and *-sam* form pwords which do not dominate a foot (thereby presumably differing from all other sound strings) is inconsistent with the definition of pwords as domains for stress and is in need of far stronger empirical motivation than is provided.

The behavior of 'stress-shifting' suffixes is characterized by the fact that the derived forms conform with regular stress patterns (cf. 4a). The behavior of the 'stress-neutral' suffixes is characterized by the condition that the stress contour (including relative prominence) of the stem of the derived form is identical to that of the base.

In most descriptions, stress neutrality is considered the main criterion for suffix classification with the result that the suffixes in 31b are grouped together with consonant-initial suffixes and are contrasted with the vowel-initial suffixes in 30 (and 31a; cf. the distinction of class II and class I suffixes in Jessen 1999 and references therein). However, such a classification would require idiosyncratic markings on all suffixes, even though their prosodic behaviour is predictable on the basis of their phonological form in all cases except for those in 31. The alternative analysis of all vowel-initial suffixes (including those which are 'stress-neutral') as integrated into the pword of their stem in contrast to all consonant-initial suffixes (and all prefixes) presupposes that syllabification is a more critical diagnostic for pword structure than is stress. This analysis is motivated by the observation that while there exist affixes which idiosyncratically require identity of stress patterns between the derived form and the base (e.g. the suffixes in 31b) there are no affixes which idiosyncratically require that the syllable structure of the derived form (e.g. the syllable positions of all individual speech sounds) be identical to that of the base. Rather syllabification domains are entirely predictable on the basis of morphological structure and the phonological form of affixes.¹⁷

4. Conclusion

Currently there is no consensus that word-internal pwords are motivated for German. In addition, there is no agreement on which criteria should be used to identify them. In this paper I have argued that the domains of stress rules (excluding "identity effects"), syllabification, and vowel lengthening systematically correlate with morphological constituents, which indicates that these prosodic rules are relevant for determining pword structure. Significantly, these rules refer to precisely those units which are dominated by the pword in the prosodic hierarchy (i.e. foot, syllable, mora). The question of whether or not affixes are integrated into the pword of the stem is decided primarily on the basis of syllabification. In German vowel-initial suffixes are integrated whereas all other affixes are not integrated. The question of whether a non-integrated affix forms a separate pword is determined primarily on the basis of stress assignment. Weight-sensitivity shows that a (monosyllabic) affix does not form a separate domain of stress assignment and hence argues against analysing it as a pword (e.g. German head prefixes, English consonant-initial suffixes). Weight-insensitivity indicates that an affix forms a domain of stress-assignment in which case it should be analyzed as a pword (e.g. German and English nonhead prefixes, German consonant-initial suffixes).

¹⁷ In fact the restriction "c-initial" can be omitted from the alignment constraints in 28a if these constraints are ranked lower than the constraint which requires syllables to have an onset (cf. Prince and Smolensky 1993).

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